OPERATOR'S MANUAL

IEEE/488
INTERFACE ASSEMBLY
19391
(Rev. F 8/94)

datum inc
TIMING DIVISION

1363 S. State College Blvd., Anaheim, CA 92806-5790 • (714) 533-6333

Digitized by the Internet Archive
in 2025

https://archive.org/details/manualsplus_08012

IEEE-488 INTERFACE ASSEMBLY
19391

1. INTRODUCTION

This assembly is designed in accordance with the IEEE-488/1978 specification and is used to provide the electrical interface between the PTS and the IEEE-488 bus. When programmed as a listener, this assembly provides the capability to remotely control the PTS. When programmed as a Talker, this assembly provides the capability to allow output of status and time value upon demade via the IEEE 488 Bus. Six of the eight bus control lines: DAV, NRFD, NDAC, ATN, EOI and IFC are used in this option. SRQ and REN have no assigned function. The controller shall not perform a serial poll of this assembly.

2. INSTALLATION

This assembly may be plugged into any available option position. Remove power from the PTS. Plug this assembly into the PTS, being careful that components are on the top side. Interconnect to the IEEE 488 Bus through the IEEE 488 connector (J1). Apply power.

3. OPERATION

Move the menu to M9 by following the procedures described in section three in the basic part of this manual. There are three menus used in this assembly.

3.1 M488-1 DEVICE ADDRESS

Device addresses are selectable from 0 to 30 inclusive.

3.2 M488-2 WORD OUTPUT FORMAT

There are two output formats selectable. Either ASCII or PACKED-BCD.

1. "PACKED-BCD format: Outputs one eight-bit byte data at aach output request containing eight bits information.
2. "ASCII" format: Output two eight-bit byte data at each output request. Each byte contains four bits information in the least significant four bits. Most significant four bits always are "0011". (0011 XXXX)

In response to the command words of "BFDE" and "BFDF" (hex) this assembly will output a string of words containing time data from HD (hundred days) to mS (milliseconds) through the IEEE-488 Bus Interface. Please refer to tables 11 and 12 for details.

EOI ON/OFF

If enabled (ON), EOI will be asserted while the last byte is being output.

3.3 POSTAMBLE

The CR/LF or LF/CR output character sequence is provided when "ASCII" output format has been selected.

4. PROGRAMMING

Each remote control input transfer comprises two sequencial eight bit words: The first word is recognized as a group address internally; the second word is recognized as program information internally.

Upon inital power on, the IEEE-488 interface option assumes the "Wait State" condition. An IFC (interface clear) command from the controller will uncoditionally terminate any interface operation and return the interface to the "Wait State" also.

TO ENTER SETUP AND CONTROL DATA

a. The source (controller) outputs LAG (listen address group) with the preassigned listen address (device address).
b. The source outputs DAV and the fst word of the data word pair.
c. The source outputs DAV and the second word of the data word pair.
d. The source sequentially repeats steps b. and c. for each data word pair input applicable to the desired operation.
e. After all data word pairs have been transferred, the source output UNL (unlisten).

This is the end of the data exchange and the IEEE-488 Bus interface option returns to the "Wait State".

TO REQUEST OUTPUT OF TIME/STATUS WORDS

a. See step a. above.
b. The source outputs DAV and "BF" in hex (or "CF" in hex).
c. The source outputs DAV and the appropriate binary number representing the desired data content of the second word.
d. The source outputs UNL (unlisten).
e. The source outputs TAG (talk address group) with the preassigned talk address (device address).
f. The IEEE-488 Bus Interface option outputs DAV and the first TIME/STATUS word data.
g. Step f. is repeated for the second and other words. The EOI, if enabled, will be asserted while the last byte is being output (if no postamble has been selected).
h. The IEEE-488 Bus Interface option then output CR/LF or LF/CR if ASCII output format with postamble has been selected. The EOI, if enabled, will be asserted while the last byte is being output. (either on LF or CR).
i. The source can repeat step e-h or output UNT (untalk). Upon received the UNT command, the IEEE-488 Bus Interface option returns to the "Wait State".

4.1 PROGRAMMING THE GENERATOR

Please refer to table 1 for the program control command words.

4.2 PROGRAMMING THE TRANSLATOR

Please refer to table 2 for the program control command words.

4.3 PROGRAMMAING THE TAPE SEARCH CONTROL OPTION

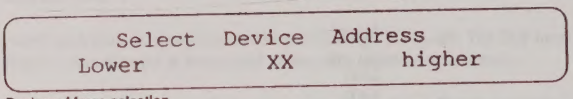
Please refer to table 3 for the program control command words.

5. IEEE-488 BUS INTERFACE CONNECTOR PIN ASSIGNMENT

11 pin	Signal
1	DI01
2	DI02
3	DI03
4	DI04
5	EOI
6	DAV
7	NRFD
8	NDAC
9	IFC
10	SRQ
11	ATN
12	GND
13	DI05
14	DI06
15	DI07
16	DI08
17	REN
18	GND
19	GND
20	GND
21	GND
22	GND
23	GND
24	GND

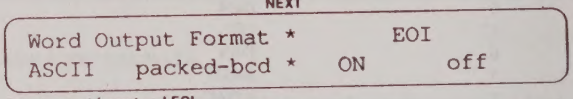
6. MAINTENANCE

No routine maintenance is required.



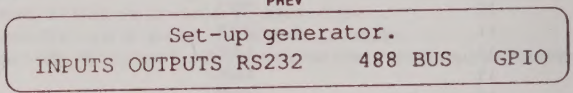
Device address selection
See Section 3.1

NEXT

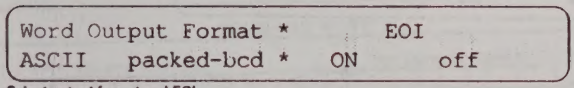


Select output format and EOI
See Section 3.2

PREV

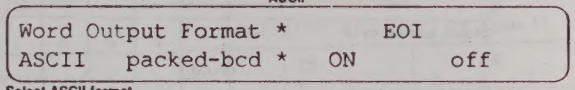


Generator and computer I/O set-up
See T3-4 in basic part



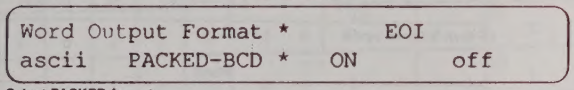
Select output format and EOI
See section 3.2

ASCII



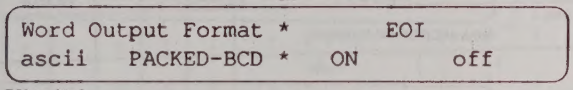
Select ASCII format
See NEXT(-1) below

PACKED-BCD



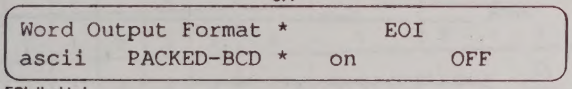
Select PACKED format
See NEXT(-2) below

ON



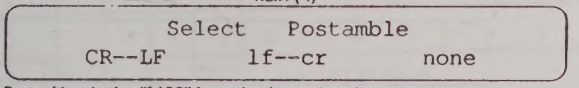
EOI enabled

OFF



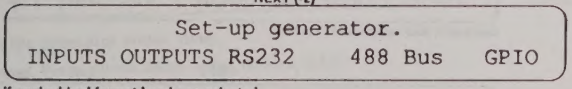
EOI disabled

NEXT (-1)



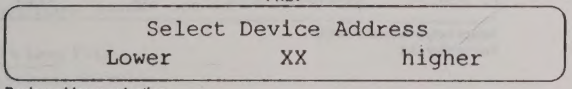
Postamble selection (if ASCII format has been selected)
See M488-3, section 3.3

NEXT (-2)

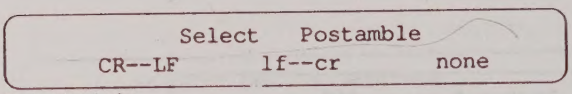


If packed-bcd format has been selected
Generator and computer I/O set-up

PREV

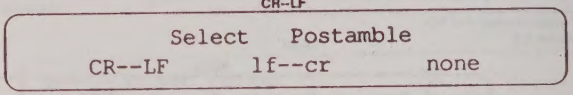


Device address selection



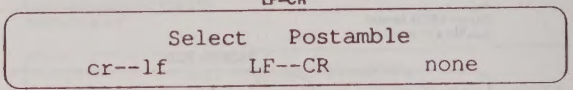
Postamble selection
See section 3.3

CR-LF



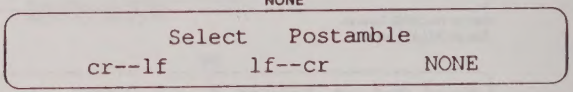
CR first, followed by LF

LF-CR

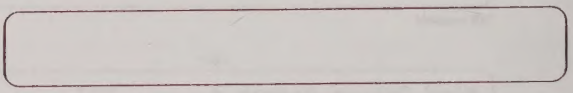


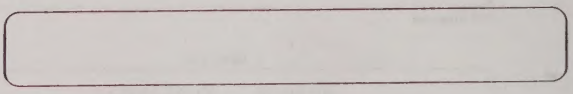
LF first, followed by CR

NONE

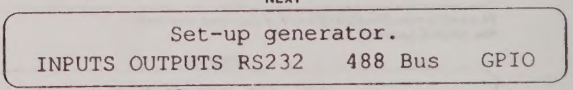


None of CR/LF will be output.



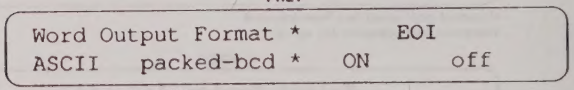


NEXT



Generator and computer I/O set-up

PREV



Select output format and EOI
See section 3.2

COMMAND WORD																
1st Byte (Group Address)								2nd Byte (Program Information)								
7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	
1	0	1	1	0	0	0	0	Slow Code Selection (6)								
1	0	1	1	0	0	0	1	GEN/SYNC GEN Mode See Table 17.								
1	0	1	1	0	0	1	0	0	TS 4	2	1	US 8	4	2	1	(1)
1	0	1	1	0	0	1	1	0	TM 4	2	1	UM 8	4	2	1	
1	0	1	1	0	1	0	0	0	0	TH 2	1	UH 8	4	2	1	
1	0	1	1	0	1	0	1	TD 8	4	2	1	UD 8	4	2	1	
1	0	1	1	0	1	1	0	0	0	0	0	HD 8	4	2	1	
1	0	1	1	0	1	1	1	0	0	0	0	0	(5) Leap Yr. 2	1		
1	0	1	1	1	0	0	0	10µS 8	4	2	1	µS 8	4	2	1	(2)
1	0	1	1	1	0	0	1	mS 8	4	2	1	100µS 8	4	2	1	
1	0	1	1	1	0	1	0	100mS 8	4	2	1	10mS 8	4	2	1	
1	0	1	1	1	0	1	1	START/STOP OPERATION (3)								
1	0	1	1	1	1	0	0	EXT Start Conditions (7)								
1	0	1	1	1	1	0	1	0	1	0	0	0	0	0	0	(8)
1	0	1	1	1	1	1	0	N/U Not Function								
1	0	1	1	1	1	1	1	TIME/STATUS REQUEST (4)								

NOTE: (1) Preset generator major time.

(2) Preset Propagation delay. (998.000mS MAX)

(3) Start/Stop generator operation: Stop = 00
Start ≠ 00

(4) Time/Status request: See table 4 for details.

(5) 00 = Leap Year.

(6) Please see table 14.

(7) Please see table 16.

(8) ARM External Start: Stop generator before applying arm. Do not apply with a negative propagation delay.

Table 1: Generator Command Word Table

COMMAND WORD																
1st Byte (Group Address)								2nd Byte (Program Information)								
7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	
1	1	0	0	0	0	0	0	⟨4⟩ Play back Ratio Select								
1	1	0	0	0	0	0	1	⟨4⟩ Search Ratio Select								
1	1	0	0	0	0	1	0	⟨5⟩ Translator Mode								
1	1	0	0	0	0	1	1	INPUT CODE SELECT ⟨1⟩								
1	1	0	0	0	1	0	0									
1	1	0	0	0	1	0	1	N/U NOT FUNCTION								
1	1	0	0	0	1	1	0									
1	1	0	0	0	1	1	1	CODE POLARITY ⟨2⟩								
1	1	0	0	1	0	0	0									
1	1	0	0	1	0	0	1									
1	1	0	0	1	0	1	0									
1	1	0	0	1	0	1	1	N/U NOT FUNCTION								
1	1	0	0	1	1	0	0									
1	1	0	0	1	1	0	1									
1	1	0	0	1	1	1	0									
1	1	0	0	1	1	1	1	TIME/STATUS REQUEST ⟨3⟩								

NOTES:

⟨1⟩ Please see table 5.

⟨2⟩ Code Polarity = NORM = 00
INVERTED ≠ 00

⟨3⟩ Time/Status Request: See table 4 for details.

⟨4⟩ Please see table 15.

⟨5⟩ Translator Mode = ØØ

Table 2: Translator Command Word Table

COMMAND WORD																
1st Byte (Group Address)								2nd Byte (Program Information)								
7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	
←	①	—	→	0	0	0	0	8	mS 4	2	1	0	0	0	0	②
				0	0	0	1	8	tS 4	2	1	8	hS 4	2	1	
				0	0	1	0	0	TS 4	2	1	8	US 4	2	1	
				0	0	1	1	0	TM 4	2	1	8	UM 4	2	1	
				0	1	0	0	0	0	TH 2	1	8	UH 4	2	1	
				0	1	0	1	8	TD 4	2	1	8	UD 4	2	1	
				0	1	1	0	0	0	0	0	8	HD 4	2	1	
				0	1	1	1	N/U NOT FUNCTION								
				1	0	0	0	8	mS 4	2	1	0	0	0	0	③
				1	0	0	1	8	tS 4	2	1	8	hS 4	2	1	
				1	0	1	0	0	TS 4	2	1	8	US 4	2	1	
				1	0	1	1	0	TM 4	2	1	8	UM 4	2	1	
				1	1	0	0	0	0	TH 2	1	8	UH 4	2	1	
				1	1	0	1	8	TD 4	2	1	8	UD 4	2	1	
				1	1	1	0	0	0	0	0	8	HD 4	2	1	
				1	1	1	1	N/U NOT FUNCTION								

NOTES:

① Tape Search Interval #, from "0000" to "1001"

② STOP TIME

③ START TIME

Table 3: Tape Search Control Command Word Table

COMMAND WORD																
1st Byte (Group Address)								2nd Byte (Program Information)								
7	6	5	4	3	2	1	0	7	6	5	4	3	2	1	0	
1	0	1	0	0	0	0	0	N/U NOT FUNCTION								
1	0	1	0	0	0	0	1									
1	0	1	0	0	0	1	0									
1	0	1	0	0	0	1	1	TTD Select, See table 6								
1	0	1	0	0	1	0	0	Speed Select, See table 7								
1	0	1	0	0	1	0	1	ECD Select, See table 8								
1	0	1	0	0	1	1	0	Auto Search Motion Control See table 9								
1	0	1	0	0	1	1	1	Manual Search Motion Control See table 10								
1	0	1	0	1	0	0	0	N/U NOT FUNCTION								
1	0	1	0	1	0	0	1									
1	0	1	0	1	0	1	0									
1	0	1	0	1	0	1	1	X	A	B	C	X	X	X	X	(4)
1	0	1	0	1	1	0	0	Last Interval # (5)								
1	0	1	0	1	1	0	1	Current Interval # (6)								
1	0	1	0	1	1	1	0	N/U NOT FUNCTION								
1	0	1	0	1	1	1	1									

NOTES:

(4) TRANSPORT PARAMETER:

A: Transport Motion Command = 1: momentary
= 0: continuous

B: Direction Control = 1 = Direction (FWD/REV) first.
= 0 = Motion (Fast) first.

C: Speed Command = 1 = momentary
= 0 = continuous

X: Don't Care

(5) Selectable from "00" to "09"

(6) Selectable from "00" to "09"

COMMAND WORD 16 BITS IN HEX ⚠2	REQUEST OUTPUT ⚠1 BIT 7 6 5 4 3 2 1 0		DESCRIPTION
B F 0 0	10μS	μS	PROPAGATION DELAY
B F 0 1	mS	100μS	" "
B F 0 2	100mS	10mS	" "
B F 0 3			
	⚠3		
B F 5 7			
B F 5 8	mS	tmS	
B F 5 9	tS	hS	
B F 5 A	TS	US	
B F 5 B	TM	UM	GENERATOR TIME
B F 5 C	TH	UH	
B F 5 D	TD	UD	
B F 5 E	0	HD	
	- CONTINUED ON NEXT PAGE -		

NOTES -

⚠1 Requested outputs are meaningless to the user, if the unit does not have appropriate options installed.

⚠2 Any 8-bit byte programming data of "FF" hex will resynchronize the I/O interface.

⚠3 Output data has no meaning to the user.

COMMAND WORD 16 BITS IN HEX (2)	REQUESTED OUTPUT (1) BIT 7 6 5 4 3 2 1 0		DESCRIPTION
B F 5 F			
	(3)		
B F 7 F			
B F 8 0	mS	0	TRANSLATOR TIME
B F 8 1	tS	hS	
B F 8 2	TS	US	
B F 8 3	TM	UM	
B F 8 4	TH	UH	
B F 8 5	TD	UD	
B F 8 6	0	HD	
B F 8 7			
	(3)		
B F 8 E			
B F 8 F	Input Code Selected,		See table 5
B F 9 0			
	(3)		
B F B 6			
B F B 7	Input Code Polarity		Norm = 00 Inverted ≠ 00
B F B 8			
	(3)		
B F D D			

Table 4

COMMAND WORD 16 BITS IN HEX (2)	REQUEST OUTPUT (1)	
	BIT 7 6 5 4 3 2 1 0	DESCRIPTION
B F D E		Generator time word output. HD-mS, See Table 11 and 12
B F D F		Translator time word output, HD-mS, (LOSS & ERR), See Table 11 & 12.
B F E O		N/U, NO OUTPUT
B F F F		

COMMAND WORD 16 BITS IN HEX (2)	REQUEST OUTPUT (1) BIT 7 6 5 4 3 2 1 0	DESCRIPTION
C F 0 0	mS 0 0 0 0	
C F 0 1	tS hS	
C F 0 2	TS US	STOP TIME
C F 0 3	TM UM	TAPE SEARCH INTERVAL #0
C F 0 4	TH UH	
C F 0 5	TD UD	
C F 0 6	0 0 0 0 HD	
C F 0 7	(3)	
C F 0 8	mS 0 0 0 0	
C F 0 9	tS hS	
C F 0 A	TS US	START TIME
C F 0 B	TM UM	TAPE SEARCH INTERVAL #0
C F 0 C	TH UH	
C F 0 D	TD UD	
C F 0 E	0 0 0 0 HD	
C F 0 F	(3)	
C F 1 0	Repeat CF00-CF0F, cover the STOP/START Time of Tape search interval #1 to #9. ex. CF3X is the command word requesting STOP/START Time in Tape search interval #3.	
C F 9 F		

- CONTINUED ON NEXT PAGE -

COMMAND WORD 16 BITS IN HEX (2)	REQUESTED OUTPUT (1) BIT 7 6 5 4 3 2 1 0	DESCRIPTION
C F A 0		
C F A 1	(3)	
C F A 2		
C F A 3	TTD	See Table 6
C F A 4	Tape Transport Speed	See Table 7
C F A 5	ECD	See Table 8
C F A 6	Status	See Table 13
C F A 7		
	(3)	
C F D F		
C F E 0		
	N/U, NO OUTPUT	
C F F F		

TRANSLATOR INPUT CODE TABLE

Data In Hex	Input Code
"00"	= IRIG B
"06"	= IRIG A
"0C"	= IRIG G
"12"	= IRIG E 100
"18"	= IRIG E 1K
"1E"	= IRIG H 100
"24"	= IRIG H 1K
"2A"	= IRIG C 100
"30"	= IRIG C 1K
"3C"	= 2137/ANGS053
"42"	= NASA 36
"4E"	= NASA 28 100
"54"	= 1892
"5A"	= XR3

NOTE: 1. Data representing other codes to be defined.

2. The translator input code select command will not be executed if the selected code is not available in the unit.

Table 5

TTD (Tape Transport Delay) SELECT TABLE

Data in Hex	TTD
"01"	= 1 Second
"02"	= 2 Seconds
"04"	= 4 Seconds
"08"	= 8 Seconds
"0C"	= 12 Seconds
"10"	= 16 Seconds
"12"	= 18 Seconds
"14"	= 20 Seconds

Others are not available.

Table 6

TAPE PLAYBACK SPEED SELECT TABLE

Data in Hex	Speed
"00"	= 15/16 IPS
"01"	= 1 7/8 IPS
"02"	= 3 3/4 IPS
"03"	= 7 1/2 IPS
"04"	= 15 IPS
"05"	= 30 IPS
"06"	= 60 IPS
"07"	= 120 IPS
"08"	= 240 IPS

Table 7

ECD (Early Closure Delay) SELECT TABLE

Data in Hex	ECD
"00"	= 0 Second
"01"	= 1 Second
"02"	= 2 Seconds
"03"	= 3 Seconds
"06"	= 6 Seconds
"08"	= 8 Seconds
"0A"	= 10 Seconds
"10"	= 16 Seconds

Others are not available.

Table 8

AUTO SEARCH MOTION CONTROL

Command In Hex	Motion
"00"	= Search to Start
"02"	= Single Cycle - Single Interval
"04"	= Single Cycle - Multi Interval
"07"	= Auto Record
"09"	= Recycle
"0A"	= Start
"0C"	= Stop

Table 9

MANUAL SEARCH MOTION CONTROL

Command In Hex	Motion
"00"	= Forward
"01"	= Fast Forward
"02"	= Reverse
"03"	= Fast Reverse
"04"	= Stop
"05"	= Record

NOTE: ⚠ Record in forward: Send Record ("05") first followed by FORWARD ("00") command.

Record in Reverse: Send Record ("05") first followed by REVERSE ("02") command.

Table 10

PACKED-BCD FORMAT
TIME WORD OUTPUTS

BIT INDEX	7	6	5	4	3	2	1	0
WORD # 1 ⚠1	E R R	L O S	X	X ⚠2	HD			
					8	4	2	1
2	TD				UD			
	8	4	2	1	8	4	2	1
3	0	0	TH		UH			
			2	1	8	4	2	1
4	0	TM			UM			
		4	2	1	8	4	2	1
5	0	TS			US			
		4	2	1	8	4	2	1
	tS				hS			
6	8	4	2	1	8	4	2	1
7	mS				0	0	0	0
	8	4	2	1				

NOTE: ⚠1 Word #1 output first.

⚠2 In translator time word
bit 7 = ERROR flag. When ERR=1, indicates translator reading error.
bit 6 = LOSE flag. When LOS=1, indicates lose of input code.
X = don't care has no meaning to the user.
In generator time word
bit 4-7 are all 0 (low).

Table 11

ASCII FORMAT TIME WORD OUTPUT

BIT INDEX	7	6	5	4	3	2	1	0
WORD # 1 ⚠1	0	0	1	1	HD			
					8	4	2	1
2	0	0	1	1	TD			
					8	4	2	1
3	0	0	1	1	UD			
					8	4	2	1
4	0	0	1	1	0	0	TH	
							2	1
5	0	0	1	1	UH			
					8	4	2	1
6	0	0	1	1	0	TM		
						4	2	1
7	0	0	1	1	UM			
					8	4	2	1
8	0	0	1	1	0	TS		
						4	2	1
9	0	0	1	1	US			
					8	4	2	1
10	0	0	1	1	tS			
					8	4	2	1
11	0	0	1	1	hS			
					8	4	2	1
12	0	0	1	1	mS			
					8	4	2	1
13	0	0	1	1	ERR	LOS	⚠3 X	X
⚠2 14 CR	0	0	0	0	1	1	0	1
⚠2 15 LF	0	0	0	0	1	0	1	0

⚠1 Word #1 output first.

⚠2 See text for output sequence select.

⚠3 In translator time word bit 3=ERROR flag. When ERR=1 indicates translator reading error.
bit 2=LOSE flag. When LOS=1 indicates lose of input code.
X=don't care, has no meaning to the user.

In generator time word bit 0-3 are all 0 (low).

Table 12

TAPE SEARCH "STATUS" OUTPUT

Bit	0	= $\overline{\text{FAST}}$ (0 = FAST)
Bit	1	= $\overline{\text{INTERVAL}}$ (0 = in internal)
Bit	2	= $\overline{\text{EARLY}}$ (0 = EARLY)
Bit	3	= $\overline{\text{FWD}}$ (0 = FORWARD)
Bit	4	= $\overline{\text{REV}}$ (0 = REVERSE)
Bit	5	= $\overline{\text{REC}}$ (0 = RECORD)
Bit	6	= STOP (1 = STOP)
Bit	7	NOT USED

Table 13

SLOW CODE FRAME PERIOD (Seconds)

Data in hex	Rate
00	1
04	5
08	10
0C	30*
10	60
14	300*
18	600
1C	1800*
20	3600*

Table 14

* These outputs have no meaning to the user if the special nine-rate slow code card is not installed.

PLAYBACK/SEARCH RATIO SELECT

Data in hex	Ratio
00	1:128
01	1:64
02	1:32
03	1:16
04	1:8
05	1:4
06	1:2
07	1:1
08	2:1
09	4:1
0A	8:1
0B	16:1
0C	32:1
0D	64:1
0E	128:1
0F	256:1

Table 15

EXTERNAL START CONDITIONS

Data in Hex	Condition
00	Positive edge
08	Negative edge
02	tick
04	pulse

Table 16

GENERATOR / SYNC GEN MODE

Data in Hex	Mode
00	Generator Mode
01	Sync-Gen On
02	Sync-Gen Off

Table 17

APPENDIX A

```
100   ' This  is a sample program requesting generator time with BASIC
200   '#1 is a output port
210   '#2 is a input port
230   '
300   'Manually set ADDRESS=17, ASCii format, EOI=ON, postamble=CR-LF
310   '
400   'Send command word "BFDE" in hex to request generator time from
405   'assy. 19391
410   X=&HBF
420   I=&HDE
450   PRINT #1, "output 17 #2;"       ' output 17 consists of MTA, UNL, LAG
470   PRINT #1, CHR$ (X); CHR$ (I)
500   PRINT 31, "enter 17:            ' enter 17 consists of UNL, MLA, TAG
510   INPUT #2, K$
520   PRINT K$
620   GOTO 500
1000  END
```

www.manualsplus.com
1000372